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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/777,942	02/12/2004	Marcus Duelk	Duelk 3	5360

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EXAMINER	
LEE, DAVID J	

ART UNIT	PAPER NUMBER
2613	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

SK

Office Action Summary	Application No.	Applicant(s)	
	10/777,942	DUELK, MARCUS	
	Examiner	Art Unit	
	David Lee	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) *21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,9-20,22 and 23* is/are rejected.

7)☒ Claim(s) *7 and 8* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/3/05, 2/12/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claim 21 is withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 4/18/2007.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 19-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 19 recites the limitation "a link element having bandpass filtering characteristics." It is not understood what the "characteristics" of bandpass filtering are.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-6, 9, and 14-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Price et al. (US Patent No. 5,867,534).

Regarding claims 1, 14, and 18, Price teaches a transmitter for a communication system, comprising: a modulator (modulator 2 of fig. 1) configured to transmit light generated by a light source (laser 1 of fig. 1), wherein the modulator is adapted to: have a peak of light transmission at a first voltage (see fig. 4: note first peak at M' and Ve=-a); substantially block light transmission at a second voltage greater than the first voltage (see fig. 4: note that light is blocked at Ve=0; note also that the second voltage (Ve=0) is greater than the first voltage (Ve=-a)); and have another peak of light transmission at a third voltage greater than the second voltage (see fig. 4: the third voltage, at Ve=+a, has a peak at M' and is greater than the second voltage Ve=0); and a driver configured to drive the modulator (driving amplifier 6 of fig. 1) with an electrical signal having two or more levels (three level electrical signal: see e.g., col. 4, lines 36-37), wherein: a first level is outside of a voltage range between the first and third voltages (see fig. 4: the first level at Ve=-a is outside the range between the first and third voltages – i.e., voltage range between Ve=-a and Ve=a); and a second level is either inside the voltage range between the first and third voltages or outside of said voltage range on the opposite side from the first level (see fig. 4: the second level, at Ve=0, is inside the voltage range between Ve=-a and Ve=a).

Regarding claim 2, Price teaches that the second level corresponds to the second voltage (see fig. 4: the second level corresponds to the second voltage at Ve=0).

Regarding claim 3, Price teaches that light transmission corresponding to the first level is lower than a peak light transmission (see fig. 4: the first level at M' is lower than a peak light at M.

Regarding claim 4, Price teaches generating the electrical signal based on a data stream, wherein each signal level corresponds to a different data value (see fig. 1: electrical signal SMF is generated based on data stream SI, where each signal level corresponds to different data values –a, 0, and a).

Regarding claim 5, Price teaches that the second level is inside the voltage range between the first and third voltages (see fig. 4: the second level, at Ve=0, is inside the voltage range between Ve=-a and Ve=a); and the two or more levels comprise a third level outside of the voltage range between the first and third voltages (see fig. 4: the third level at Ve=+a is outside the voltage range between Ve=-a and Ve=+a).

Regarding claim 6, Price teaches that the electrical signal is generated based on a duobinary data sequence (see e.g., Abstract) and each of the first, second, and third levels corresponds to a different duobinary data value (see e.g., col. 4, line 50: ternary level electrical signal corresponding to values -1, 0, +1).

Regarding claim 9, Price teaches that a relative optical phase shift for the transmitted optical beam corresponding to the first and third levels is different than about 180 degrees (see e.g., col. 5, lines 28-35).

Regarding claim 15, Price teaches that the transmitter comprises the light source (see fig. 1: transmitter on the left side of link 10 comprises light source 1).

Regarding claim 16, Price teaches an encoder configured to convert an incoming data stream into an encoded data sequence (encoder 4 of fig. 1), wherein the driver generates the electrical signal based on the encoded data sequence such that each signal level corresponds to a different data value of said sequence (see e.g., col. 4, line 50: ternary level electrical signal corresponding to values -1, 0, +1).

Regarding claim 17, Price teaches that the encoded data sequence is a duobinary data sequence (see e.g., Abstract).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 10, 11, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Price et al.

Regarding claims 10 and 11, Price does not specifically disclose that the first level is selected based on desire receiver sensitivity at a selected bit error rate or an eye diagram at a receiver of the communication system. However, it would have been clear to a skilled artisan to select an optimal value within a receiver's sensitivity range or based on an eye diagram at the receiver. It would have been obvious to a skilled artisan at the time of invention to do so in order to transmit a signal with the most accuracy and precision.

Regarding claim 13, Price does not specifically disclose that the difference between the first level and the first voltage exceeds 10% of the difference between the first and third voltages. However, absent any teaching of criticality, it would have been a matter of design choice or given the general environment, it would have been obvious to obtain an optimal value by routine experimentation. Therefore, a difference exceeding 10% would have been attainable for a skilled artisan at the time of invention.

8. Claims 12, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Price et al. in view of Hansen et al. (US Pub. No. 2002/0063928 A1).

Regarding claim 12, Price teaches that the modulator is a Mach-Zehnder modulator (see col. 3, line 42), but does not specifically disclose that the communication system is a wavelength division multiplexing (WDM) communication system. Hansen, from a similar field of endeavor, teaches a duobinary transmission apparatus for use in a WDM communication system (see fig. 5). It would have been obvious to a skilled artisan at the time of invention to incorporate the communication system of Price in a WDM transmission system in order to transmit more information at a greater bandwidth.

Regarding claim 19, in view of the 112 rejection above, Price teaches a receiver configured to receive optical signals from the transmitter via a communication link (receiver 7 of fig. 1), but does not specifically teach a link element that has bandpass filtering characteristics. Hansen, from a similar field of endeavor, teaches a duobinary transmission apparatus comprising a link element that has bandpass filtering characteristics (see claim 8). It would have been

obvious to a skilled artisan at the time of invention to incorporate a link element having bandpass filtering characteristics in order to optimize bandwidth.

Regarding claim 20, in view of the 112 rejection above, Price does not specifically disclose that the link element is an optical router and the communication system has multiple instances of the transmitter. Hansen, from a similar field of endeavor teaches an optical router (502 of fig. 5) and multiple instances of a duobinary transmitter (501 – 501a of fig. 5). It would have been obvious to a skilled artisan at the time of invention to use the transmission configuration of Hansen in the communication system of Price in order to transmit more information at a greater bandwidth.

9. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Price et al. in view of Hansen et al. and in further view of Sharp (US Patent No. 6,741,761 B2).

Regarding claim 22, the combined invention of Price and Hansen teaches an apparatus, comprising an optical transmitter coupled to an optical receiver via a communication link (see fig. 1), wherein: the optical transmitter comprises: a modulator adapted to modulate an optical beam with data (modulator 2 of fig. 1); and a driver adapted to drive the modulator with an electrical signal corresponding to the data (driver 6 of fig. 1); the communication link subjects the modulated beam to bandpass filtering (see Hansen, claim 8). The combined invention of Price and Hansen does not specifically disclose that the modulator is overdriven. However, the technique of overdriving a modulator is well known in the art. For example, Sharp teaches an optical transmitter coupled to an optical receiver via a communication link (see fig. 1), wherein the optical transmitter comprises a modulator adapted to modulated an optical beam with data

(MZ modulator of fig. 1) and a driver adapted to drive the modulator with an electrical signal (drive signals 18 and 20 of fig. 1), wherein the modulator is overdriven to introduce a phase shift between optical symbols (see fig. 2 and col. 1, lines 54-56). It would have been obvious to a skilled artisan at the time of invention to overdrive the modulator in order to reduce the ER which would yield an improved bit error rate at the receiver (col. 1, lines 56-58). It is noted that overdriving the modulator would cause the intersymbol interference to be reduced.

Regarding claim 23, Price teaches that the modulator is adapted to: have a peak of light transmission at a first voltage (see fig. 4: note first peak at M' and Ve=-a); substantially block light transmission at a second voltage greater than the first voltage (see fig. 4: note that light is blocked at Ve=0; note also that the second voltage (Ve=0) is greater than the first voltage (Ve=-a)); and have another peak of light transmission at a third voltage greater than the second voltage (see fig. 4: the third voltage, at Ve=+a, has a peak at M' and is greater than the second voltage Ve=0); and a driver configured to drive the modulator (driving amplifier 6 of fig. 1) with an electrical signal having two or more levels (three level electrical signal: see e.g., col. 4, lines 36-37), wherein: a first level is outside of a voltage range between the first and third voltages (see fig. 4: the first level at Ve=-a is outside the range between the first and third voltages – i.e., voltage range between Ve=-a and Ve=a); and a second level is either inside the voltage range between the first and third voltages or outside of said voltage range on the opposite side from the first level (see fig. 4: the second level, at Ve=0, is inside the voltage range between Ve=-a and Ve=a).

Allowable Subject Matter

10. Claims 7 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Lee whose telephone number is (571) 272-2220. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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